

- B. The Facility discharges wastewater to the Sacramento River within the Sacramento-San Joaquin Delta, a water of the United States. The Discharger was previously regulated by Order R5-2010-0114-04 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0077682 adopted on 9 December 2010; amended on 1 December 2011 (Order R5-2011-0083), 4 October 2013 (Order R5-2013-0124), 8 August 2014 (Orders R5-2014-0102 and R5-2014-0103), 9 October 2014 (Order R5-2014-0122), and 31 July 2015 (Order R5-2015-0097); and expired on 1 December 2015. Attachment B provides a map of the area around the Facility. Attachment C provides a flow schematic of the Facility.

Prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater that results in a decrease of flow in any portion of a watercourse, the Discharger must file a petition with the State Water Board, Division of Water Rights, and receive approval for such a change. The State Water Board retains the jurisdictional authority to enforce such requirements under Water Code section 1211.

- C. The Discharger filed a report of waste discharge (ROWD) and submitted an application for reissuance of its WDR's and NPDES permit on 4 June 2015. The application was deemed complete on 3 August 2015. A site visit was conducted on 23 October 2015 to observe operations and collect additional data to develop permit limitations and requirements for waste discharge.
- D. This Order was amended by Order R5-2018-0058 on 2 August 2018 to suspend weekly acute toxicity test during months when the Discharger is implementing the Effluent Valve Replacement Project (EVR Project). During such months, the Discharger shall perform monthly acute toxicity testing.

II. FACILITY DESCRIPTION

The Discharger provides wastewater treatment service to the Cities of Sacramento, Folsom, and West Sacramento, the communities of Courtland and Walnut Grove, and the Sacramento Area Sewer District. The Sacramento Area Sewer District service area includes the Cities of Elk Grove, Rancho Cordova, Citrus Heights, as well as portions of the unincorporated areas of Sacramento County. The population served is approximately 1.48 million people.

The Discharger owns and operates the main trunk lines/interceptors feeding the Facility. The smaller diameter collection systems are owned and operated by the various contributing agencies and not by the Discharger, and are regulated under the State Water Resources Control Board (State Water Board) Order 2006-0003-DWQ, Statewide General WDR's for Sanitary Sewer Systems, effective November 2006.

The City of Sacramento operates both a separate sewer collection system and a combined (storm water and wastewater) collection system. During wet weather the Facility is contracted to accept up to 60 MGD of wastewater and storm runoff from the downtown Sacramento combined collection system. Combined collection flows in excess of 60 MGD are managed by the Combined Wastewater Collection and Treatment System (CWCTS) operated by the City of Sacramento. The CWCTS discharge is governed by WDR Order R5-2015-0045 issued to the City of Sacramento. Depending on treatment and conveyance capacity, flow in excess of 60 MGD may be received at the Facility.

The Facility discharges to the Sacramento River just downstream of the Freeport Bridge via an outfall diffuser. The outfall diffuser is approximately 300 feet long with 74 ports and is placed perpendicular to the river flow. At times, the river flows in the reverse direction northeast towards the City of Sacramento, due to tidal activity during low river flows. The Discharger diverts its discharge to emergency storage basins whenever these conditions exist. The Discharger has

determined in studies that river flows of at least 1,300 cubic feet per second (cfs) and providing a flow ratio of at least 14 to 1 (river: effluent) are required to allow for adequate mixing of the effluent through the outfall diffuser.

The Discharger currently provides 5.0 MGD of treated wastewater to the Water Reclamation Facility (WRF) for unrestricted use, with a provision for WRF expansion to 10 MGD. The WRF is regulated under Master Reclamation Permit No. 97-146.

A. Description of Wastewater and Biosolids Treatment and Controls

1. **Existing Facility.** The Facility is staffed and operated 24 hours per day and the liquid treatment process consists of influent pumps, septage receiving station, mechanical bar screening; aerated grit handling, grit classifiers that wash and dewater grit, covered primary sedimentation tanks, pure oxygen biological treatment by activated sludge, secondary sedimentation, disinfection with chlorine gas, and dechlorination with sulfur dioxide. Effluent can be diverted to lined and unlined emergency storage basins (ESBs) as needed to meet effluent dilution, thermal, and disinfection requirements or divert excess flows. The current average dry weather flows are approximately 119 MGD and the Facility has a design average dry weather flow capacity of 181 MGD. Odors are controlled through stripping towers and carbon treatment.
2. **Future Facility.** Based on information provided by the Discharger, the Facility will be modified in order to comply with certain requirements in this Order consistent with the applicable compliance deadlines. The future Facility and operation is as follows, and differs seasonally.

The design capacity of the future Facility will remain 181 MGD. Facility modification will include replacement of the existing pure oxygen biological treatment facilities with biological nutrient removal (BNR) air activated treatment facilities capable of removing ammonia and nitrate nitrogen, addition of tertiary treatment in the form of filtration with granular media filters, sidestream ammonia treatment, and the storage capacity of the ESBs A, B, C and D will be increased and lined. The Facility will continue to be staffed and operated 24 hours per day and will consist of influent pumps; septage receiving station; anaerobically digested material reception and storage facility; mechanical bar screening; aerated grit handling; grit classifiers that wash and dewater grit; covered primary sedimentation tanks; primary effluent pumping station and peak-shaving storage facilities (using ESBs for flow equalization); BNR air activated sludge treatment; nitrifying sequencing batch reactor for treating high ammonia concentration waste streams from solids storage basins and biosolids reclamation facility; secondary sedimentation; secondary effluent screens; filter influent pumping station; granular media filtration; disinfection with chlorine liquid in a covered disinfection contact basin; and dechlorination with sodium bisulfite. Compliant effluent can be diverted to the lined ESBs as needed to meet effluent dilution and thermal limits before discharge to the river. Non-compliant effluent, primary influent or effluent, and raw wastewater can be diverted to the lined ESBs as needed for any reason including process upsets, or diversions for excess flows, and returned for additional treatment to the influent of the facility. Odors are controlled through biological fixed media scrubbers, scrubbing tower, chemical oxidizing towers, and carbon treatment towers.

The BNR activated sludge treatment facilities will be designed to process up to 330 MGD. Flows in excess of 330 MGD will be stored in peak-shaving storage facilities (ESBs) and returned for processing through the BNR facilities when capacity is available. All wastewater will receive secondary treatment through the BNR facilities. The tertiary filters will be designed to process flows up to 217 MGD, measured as a daily average.

This Order requires seasonal disinfection requirements and the Facility will be operated differently seasonally, as follows:

- a. **1 May – 31 October.** The Facility will be operated to meet Title 22 or equivalent disinfection criteria (Special Provision VI.C.6.a).
- b. **1 November – 30 April (commences 1 November 2023)**

In the descriptions below, “filtered” means tertiary filtration of BNR effluent under filter operations consistent with the design hydraulic loading rate necessary to comply with the Title 22, or equivalent, disinfection criteria.

 - i. When the BNR effluent flow is 217 MGD, or less, measured as a daily average:
The entire BNR effluent flow will be filtered.
 - ii. When BNR effluent flow exceeds 217 MGD:
Up to 217 MGD will be filtered, and remaining wastewater will not be filtered. A portion of the filtered effluent may be reclaimed. The remaining filtered and non-filtered wastewater will be disinfected and combined with reclaimed water in excess of demands, prior to the de-chlorination facilities.
3. **Biosolids Treatment.** Solids are thickened by dissolved air flotation and gravity belt thickeners. Primary and secondary sludge is mixed. Fats, Oils, and Grease from FOG receiving station may be mixed to the waste and the mixed waste is sent to anaerobic digesters for approximately 15 days or more, stored at the sludge stabilization basins for 3 to 5 years then harvested and injected into lined dedicated land disposal sites. Some biosolids are recycled with the Synagro Organic Fertilizer Company and the Discharger can dispose of biosolids at the Keifer Landfill as an emergency disposal option. Separate WDR’s (Order R5-2015-0133) in conformance with California Code of Regulations, title 27, division 2, subdivision 1 regulate the biosolids and solids storage and disposal facilities, the Class II dedicated land treatment units, unclassified solids storage basins, and the Class III grit and screenings landfill closure. When the treatment plant upgrades are complete, biosolids treatment and disposal will remain unchanged.
4. **Groundwater Corrective Action Plan (CAP).** As part of WDR Order R5-2015-0133, a CAP was initiated by the Discharger. The CAP is to address elevated constituent concentrations that were observed in samples from groundwater monitoring wells down gradient of the Dedicated Land Disposal areas (DLD’s) and the Class III landfill when compared to upgradient groundwater monitoring wells. Extraction wells are used for hydraulic control of the site. Characterization of the groundwater aquifer is documented in the reports submitted twice annually pursuant to WDR Order R5-2015-0133. The Discharger conveys the extracted groundwater from the CAP extraction wells, at an average pumping rate of approximately 0.4 MGD, to the Facility effluent channel downstream of the secondary clarifiers and upstream of the plant chlorination station or onsite constructed wetlands. Discharging water from the CAP system downstream of the secondary clarifiers is acceptable and does not decrease the amount of treatment as the treatment processes upstream of this discharge point are not designed for removal of the CAP discharge constituents of concern. Furthermore, based on the extracted groundwater sampling, estimates of CAP discharge constituent concentrations are either below current Facility effluent concentrations or do not have a reasonable potential to violate water quality objectives in the receiving water. Based on these considerations, the Central Valley Water Board finds disposal of CAP discharge as described above to be acceptable. The CAP discharge is being modified in 2016 to return flows to the Facility influent rather than continue to discharge to the secondary effluent channel.

B. Discharge Points and Receiving Waters

1. The Facility is located in Section 19, T7N, R5E, MDB&M, as shown in Attachment B, a part of this Order.
2. Treated municipal wastewater is discharged at Discharge Point 001 to the Sacramento River, a water of the United States, within the legal boundary of the Sacramento-San Joaquin Delta at a point latitude 38° 27' 15" N and longitude 121° 30' 00" W.
3. The Facility and Discharge Point 001 are located near the community of Freeport south of the City of Sacramento.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations contained in Order R5-2010-0114-04 for discharges from Discharge Point 001 (Monitoring Location EFF-001) and representative monitoring data from the term of Order R5-2010-0114-04 are as follows:

Table F-2. Historic Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitation			Monitoring Data (March 2011 - September 2015)		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ 20°C)	mg/L	10	15	20	10	16	21
	lbs/day ¹	15,100	22,700	30,200	15,834	20,049	31,930
	% Removal	85	--	--	96 ²	--	--
Total Suspended Solids	mg/L	10	15	20	10	14	20
	lbs/day ¹	15,100	22,700	30,200	12,049	18,372	25,687
	% Removal	85	--	--	96 ²	--	--
pH	standard units	--	--	6.0 – 8.0	--	--	6.0 – 7.6
Bis (2-ethylhexyl) Phthalate	µg/L	--	--	13	--	--	8.1
Carbon Tetrachloride	µg/L	--	--	5.3	--	--	2.9
Chloro-dibromomethane (prior to nitrification facilities operating)	µg/L	--	--	2.2	--	--	1.2
Chloro-dibromomethane (after nitrification facilities begin operating)	µg/L	--	--	12	--	--	N/A
Copper, Total Recoverable	µg/L	7.4	--	10	7.7	--	10
Cyanide	µg/L	--	--	11	--	--	8.6
Dibenzo (ah) anthracene	µg/L	0.2	--	0.4	<0.001	--	<0.001
Dichloro-bromomethane (prior to nitrification facilities operating)	µg/L	--	--	3.4	--	--	3.9

Parameter	Units	Effluent Limitation			Monitoring Data (March 2011 - September 2015)		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge
Dichloro-bromomethane (after nitrification facilities begin operating)	µg/L	--	--	35	--	--	N/A
Methylene Chloride	µg/L	4.7	--	11	1.3	--	5
Pentachlorophenol	µg/L	--	--	18	--	--	<0.005
Tetrachloroethylene	µg/L	--	--	4.4	--	--	1
Settleable Solids	ml/L	0.1	--	0.2	<0.1	--	0.1
Aluminum, Total Recoverable	µg/L	470/200 ³	683	--	33/17 ⁴	NR	--
Ammonia Nitrogen, Total (as N) (Apr- Oct)	mg/L	1.5	--	2.0	38	--	43
	lbs/day ¹	2,264	--	3,019	31,747	--	53,200
Ammonia Nitrogen, Total (as N) (Nov- Mar)	mg/L	2.4	--	3.3	36	--	43
	lbs/day ¹	3,622	--	4,981	36,399	--	54,991
Nitrate, Total (as N)	mg/L	10	--	--	0.425	--	--
Manganese, Total Recoverable	µg/L	--	--	270	--	--	140
Methyl Tertiary Butyl Ether	µg/L	--	--	18	--	--	0.34
Chronic Toxicity	TUc	--	--	⁵	--	--	16
Acute Toxicity	% Survival	--	--	70/90 ⁶	--	--	45 ⁷
Temperature	°F	--	--	20/25 ⁸	--	--	26.4 ⁹
Total Residual Chlorine	mg/L	--	0.011 ¹⁰	0.019 ¹¹	--	--	11.9
Total Coliform Organisms (May-Oct)	MPN/100 mL	--	2.2 ¹²	23 ¹³ /240 ¹⁴	--	--	1,600
Total Coliform Organisms (Nov-Apr)	MPN/100 mL	2.2 ¹⁵	23 ¹⁶	240 ¹⁴	--	--	1,600
Average Dry Weather Flow	MGD	--	--	181 ¹⁷	--	--	307.4 ¹⁸
Electrical Conductivity @ 25°C	µmhos/cm	900 ³	--	--	907 ⁴	--	--
Mercury	lbs/year	2.3 ¹⁹	--	--	1.56 ²⁰	--	--
Chlorpyrifos	µg/L	²¹	--	²²	<0.003	--	<0.003
Diazinon	µg/L	²¹	--	²²	<0.004	--	<0.004

Parameter	Units	Effluent Limitation			Monitoring Data (March 2011 - September 2015)		
		Average Monthly	Average Weekly	Maximum Daily	Highest Average Monthly Discharge	Highest Average Weekly Discharge	Highest Daily Discharge

N/A – Not Applicable

NR – Not Reported

- 1 Based on a design average dry weather flow of 181 MGD.
- 2 Reflects the minimum observed percent removal.
- 3 Applied as an annual average effluent limitation.
- 4 Reflects the maximum observed annual average effluent concentration.
- 5 There shall be no chronic whole effluent toxicity in the effluent discharge.
- 6 Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:
 - i. 70%, minimum of any one bioassay; and
 - ii. 90%, median for any three consecutive bioassays.
- 7 Reflects the minimum observed percent survival.
- 8 The maximum temperature of the discharge shall not exceed the natural receiving water temperature at RSWU-001 by more than 20 F from 1 May through 30 September and more than 25 F from 1 October through 30 April.
- 9 Reflects the maximum difference between the effluent and natural receiving water temperature at RSWU-001.
- 10 Applied as a 4-day average effluent limitation.
- 11 Applied as a 1-hour average effluent limitation.
- 12 Applied as a 7-day median effluent limitation.
- 13 Not to be exceeded more than once in any 30-day period.
- 14 Applied as an instantaneous maximum effluent limitation.
- 15 Applied as a monthly median effluent limitation.
- 16 Applied as a weekly median effluent limitation.
- 17 The average dry weather discharge flow shall not exceed 181 MGD.
- 18 Reflects the maximum observed daily average flow.
- 19 For a calendar year, the performance-based interim annual mass load of total mercury shall not exceed 2.3 lbs/year.
- 20 Reflects the maximum observed annual mass loading.
- 21 Average Monthly Effluent Limitation

$$S_{AMEL} = \frac{C_{D\text{ AVG}}}{0.08} + \frac{C_{C\text{ AVG}}}{0.012} \leq 1.0$$

$C_{D\text{-avg}}$ = average monthly diazinon effluent concentration in µg/L.
 $C_{C\text{-avg}}$ = average monthly chlorpyrifos effluent concentration in µg/L.
- 22 Maximum Daily Effluent Limitation

$$S_{MDEL} = \frac{C_{D\text{ MAX}}}{0.16} + \frac{C_{C\text{-max}}}{0.025} \leq 1.0$$

$C_{D\text{-max}}$ = maximum daily diazinon effluent concentration in µg/L.
 $C_{C\text{-max}}$ = maximum daily chlorpyrifos effluent concentration in µg/L

D. Compliance Summary

1. The Central Valley Water Board issued Administrative Civil Liability (ACL) Complaint R5-2013-0502 on 11 January 2013 which proposed to assess a civil liability of \$21,000 against the Discharger for effluent violations of settleable matter, chlorine residual, manganese, dichlorobromomethane, bis (2-ethylhexyl) phthalate, and copper that occurred between 1 May 2008 and 31 August 2012. The Discharger paid the mandatory minimum penalty of \$21,000.

2. The Central Valley Water Board issued ACL Complaint R5-2014-0554 on 8 September 2014 which proposed to assess a civil liability of \$6,000 against the Discharger for effluent violations of temperature and ammonia that occurred between September 2012 through 31 March 2014. The Discharger paid the mandatory minimum penalty of \$6,000.

E. Planned Changes

As discussed further in section II.A.2 of this Fact Sheet, the Discharger is constructing upgrades to the Facility, including replacement of the existing pure oxygen biological treatment facilities with BNR air activated treatment facilities capable of removing ammonia and nitrate nitrogen, addition of tertiary treatment in the form of filtration with granular media filters, sidestream ammonia treatment, and an increase in lined emergency storage basin facilities.

In all, Facility modifications will result in the construction, commissioning, and operation of seven or more new or reconstructed wastewater treatment units: flow equalization, disinfection chemical storage, biological nutrient removal (phase I and phase II), nitrifying sidestream treatment, and tertiary treatment facilities. Biological nutrient removal and nitrifying sidestream treatment are biological treatment processes. The start-up and commissioning period (i.e., period of time necessary for adjusting and testing of new or reconstructed wastewater treatment units) for projects of this size, while maintaining consistent and ongoing treatment operations, is a complex undertaking. It involves the gradual transitioning of wastewater treatment from current plant facilities over to new or reconstructed treatment plant facilities. Prior to start-up and adjustment, the Discharger intends to submit start-up operation plans for the period of adjustment and testing to the Central Valley Water Board for review. The Discharger has indicated that plans will be submitted separately for each of the individual wastewater treatment units, and will be submitted in accordance with the schedule for the individual wastewater treatment unit in question. Specifically, such plans will be submitted at least 30 days prior to the period of adjusting and testing that will take place for each individual wastewater treatment unit. It is anticipated that the period of adjustment and testing may occur over several months to over many months - depending on the wastewater treatment unit. However, potential effluent or other permit violations will likely only occur during certain times of the adjustment and testing period. If the Discharger wishes to apply for protection from Mandatory Minimum Penalties during the start-up periods, then pursuant to Water Code section 13385(j)(1)(D), the Discharger's start-up operations plans must include steps that the Discharger will take to prevent violations and identify the shortest reasonable time required for the period of adjusting and testing that could result in effluent or permit violations. The Central Valley Water Board will work with the Discharger to identify the appropriate steps and actions to be taken to minimize the potential for Mandatory Minimum Penalties.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in this Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order serves as WDR's pursuant to article 4, chapter 4, division 7 of the California Water Code (commencing with section 13260). This Order is also issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. EPA and chapter 5.5, division 7 of the Water Code (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from this Facility to surface waters.

B. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of CEQA, (commencing with section 21100) of Division 13 of the Public Resources Code.

C. State and Federal Laws, Regulations, Policies, and Plans

1. **Water Quality Control Plan.** Requirements of this Order specifically implement the applicable Water Quality Control Plans.
 - a. **Basin Plan.** The Central Valley Water Board adopted a Water Quality Control Plan, Fourth Edition (Revised October 2011), for the Sacramento and San Joaquin River Basins (hereinafter Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Requirements in this Order implement the Basin Plan. In addition, the Basin Plan implements State Water Board Resolution 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Beneficial uses applicable to Sacramento River within the Sacramento-San Joaquin Delta are as follows:

Table F-3. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Sacramento River	<u>Existing:</u> Municipal and domestic water supply (MUN); agricultural supply including irrigation and stock watering (AGR); industrial process supply (PRO); industrial service supply (IND); water contact recreation (REC-1); non-contact water recreation (REC-2); warm freshwater habitat (WARM); cold freshwater habitat (COLD); cold and warm migration of aquatic organisms (MIGR); warm spawning, reproduction, and/or early development (SPWN); wildlife habitat (WILD); and navigation (NAV).
--	Groundwater	<u>Existing:</u> Municipal and domestic supply (MUN); agricultural supply (AGR); industrial service supply (IND); and industrial process supply (PROC).

- b. **Bay-Delta Plan.** The *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Bay-Delta Plan) was adopted in May 1995 by the State Water Board superseding the 1991 Bay-Delta Plan. The Bay-Delta Plan identifies the beneficial uses of the estuary and includes objectives for flow, salinity, and endangered species protection.

The State Water Board adopted Decision 1641 (D-1641) on 29 December 1999, and revised on 15 March 2000. D-1641 implements flow objectives for the Bay-Delta Estuary, approves a petition to change points of diversion of the Central Valley Project and the State Water Project in the Southern Delta, and approves a petition to change places of use and purposes of use of the Central Valley Project. The water quality objectives of the Bay-Delta Plan are implemented as part of this Order.
 - c. **Thermal Plan.** The State Water Board adopted the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays*

and Estuaries of California (Thermal Plan) on 7 January 1971, and amended this plan on 18 September 1975. This plan contains temperature objectives for surface waters. Requirements of this Order implement the Thermal Plan.

For the purposes of the Thermal Plan, the Discharger is considered to be an Existing Discharger of Elevated Temperature Waste. The Thermal Plan in section 5.A contains the following temperature objectives for surface waters that are applicable to this discharge:

"5. Estuaries

A. Existing dischargers

(1) Elevated temperature waste discharges shall comply with the following:

- a. *The maximum temperature shall not exceed the natural receiving water temperature by more than 20°F.*
- b. *Elevated temperature waste discharges either individually or combined with other discharges shall not create a zone, defined by water temperatures of more than 1°F above natural receiving water temperature, which exceeds 25 percent of the cross-sectional area of a main river channel at any point.*
- c. *No discharge shall cause a surface water temperature rise greater than 4°F above the natural temperature of the receiving waters at any time or place.*
- d. *Additional limitations shall be imposed when necessary to assure protection of beneficial uses.*

- i. **Thermal Plan Exceptions.** The Discharger requested limited exceptions to Thermal Plan Objectives 5A(1)(a) and 5A(1)(b). The Thermal Plan allows regional boards to provide exceptions to specific water quality objectives in the Thermal Plan so long as the exceptions comply with CWA section 316(a) and federal regulations. The applicable exception is promulgated in 40 C.F.R. section 125.73(a), which provides that, *"Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the director that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made."* The Thermal Plan requires that the State Water Board concur with any exceptions prior to them becoming effective.

The Central Valley Water Board has considered the applicability of the Thermal Plan exceptions for the Facility's discharge. Based on all evidence in the record the Board finds that the Discharger has adequately demonstrated through comprehensive thermal effect studies that the effluent and receiving water limitations based on the Thermal Plan are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of

shellfish, fish and wildlife in and on the body of water into which the discharge is made. The Board also finds that the alternative limitations, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the Sacramento River and Delta. The detailed rationale for allowing the Thermal Plan exceptions is provided in Attachment I.

In accordance with 40 C.F.R. section 125.73(a) this Order grants the following exceptions to Thermal Plan objectives 5A(1)(a) and 5A(1)(b):

- **Thermal Plan Objective 5A(1)(a) Exception:**

The maximum temperature of the discharge shall not exceed the natural receiving water temperature by more than:

25° F from 1 October through 30 April;

-and-

20° F from 1 May through 30 September

- **Thermal Plan Objective 5A(1)(b) Exception:**

If the natural receiving water temperature is less than 65°F, the discharge shall not create a zone, defined by water temperature of more than 2°F above natural temperature, which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution.

If the natural receiving water temperature is 65°F or greater, the discharge shall not create a zone, defined by a water temperature of 1°F or more above natural receiving water temperature which exceeds 25 percent of the cross sectional area of the River at any point outside the zone of initial dilution for more than one hour per day as an average in any month.

These alternative effluent and receiving water limitations are not effective unless the Central Valley Water Board receives concurrence from the State Water Board regarding the Thermal Plan exceptions. On 14 January 2016, Central Valley Water Board staff provided technical justification for the Thermal Plan exceptions to the State Water Board for their review.¹ On 11 March 2016, State Water Board staff agreed there was adequate support for the exceptions and following adoption of this Order by the Central Valley Water Board will recommend concurrence by the State Water Board for the Thermal Plan exceptions.²

- d. **Sediment Quality.** The State Water Board adopted the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* on 16 September 2008, and it became effective on 25 August 2009. This plan supersedes other narrative sediment quality objectives, and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays

¹ Memorandum from Pamela Creedon, Executive Officer, Central Valley Water Board to Tom Howard, Executive Director, State Water Board, 14 January 2016

² Memorandum from Karen Larsen, Deputy Director, State Water Board Division of Water Quality to Pamela Creedon, Executive Officer, Central Valley Water Board, 11 March 2016

and estuaries. Requirements of this Order implement sediment quality objectives of this Plan.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** U.S. EPA adopted the NTR on 22 December 1992, and later amended it on 4 May 1995 and 9 November 1999. About forty criteria in the NTR applied in California. On 18 May 2000, U.S. EPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on 13 February 2001. These rules contain federal water quality criteria for priority pollutants.
3. **State Implementation Policy.** On 2 March 2000, the State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP). The SIP became effective on 28 April 2000, with respect to the priority pollutant criteria promulgated for California by the U.S. EPA through the NTR and to the priority pollutant objectives established by the Central Valley Water Board in the Basin Plan. The SIP became effective on 18 May 2000, with respect to the priority pollutant criteria promulgated by the U.S. EPA through the CTR. The State Water Board adopted amendments to the SIP on 24 February 2005, that became effective on 13 July 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.
4. **Antidegradation Policy.** Federal regulation 40 C.F.R. section 131.12 requires that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California"). Resolution 68-16 is deemed to incorporate the federal antidegradation policy where the federal policy applies under federal law. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Central Valley Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provision of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.
5. **Anti-Backsliding Requirements.** Sections 402(o) and 303(d)(4) of the CWA and federal regulations at 40 C.F.R. section 122.44(l) restrict backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.
6. **Domestic Water Quality.** In compliance with Water Code section 106.3, it is the policy of the State of California that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes. This Order promotes that policy by requiring discharges to meet MCL's designed to protect human health and ensure that water is safe for domestic use.
7. **Endangered Species Act Requirements.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code, §§ 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. §§ 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The Discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

8. **Emergency Planning and Community Right to Know Act.** Section 13263.6(a) of the Water Code, requires that *“the Regional Water Board shall prescribe effluent limitations as part of the waste discharge requirements of a POTW for all substances that the most recent toxic chemical release data reported to the state emergency response commission pursuant to Section 313 of the Emergency Planning and Community Right to Know Act of 1986 (42 U.S.C. Sec. 11023) (EPCRA) indicate as discharged into the POTW, for which the State Water Board or the Regional Water Board has established numeric water quality objectives, and has determined that the discharge is or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to, an excursion above any numeric water quality objective”*.

U.S EPA’s Toxics Release Inventory (TRI) indicates that several pollutants were discharged to the Facility. Of these pollutants, numeric water quality objectives have been adopted for ammonia, benzene, benzo (g,h,i) perylene, chlorobenzene, chromium compounds, copper and copper compounds, dichloromethane, ethylbenzene, lead and lead compounds, manganese, methyl tertiary butyl ether, naphthalene, nitrate compounds, polycyclic aromatic hydrocarbons (PAH’s), toluene, and xylene in the Basin Plan and the CTR. As detailed elsewhere in this Permit, available effluent quality data indicate that effluent concentrations of ammonia, copper, and nitrate have a reasonable potential to cause or contribute to an excursion above numeric water quality objectives and effluent limitations for these pollutants are included in this Order.

9. **Storm Water Requirements.** U.S. EPA promulgated federal regulations for storm water on 16 November 1990 in 40 C.F.R. parts 122, 123, and 124. The NPDES Industrial Storm Water Program regulates storm water discharges from wastewater treatment facilities. Wastewater treatment plants are applicable industries under the storm water program and are obligated to comply with the federal regulations. The State Water Board Water Quality Order No. 2014-0057-DWQ, NPDES General Permit No. CAS000001, NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, does not require facilities to obtain coverage if storm water is captured and treated and/or disposed of with the Facility’s NPDES permitted process wastewater or if storm water is disposed in evaporation ponds, percolation ponds, or combined sewer systems. The Discharger captures and treats all storm water that falls on-site. Therefore, coverage under the General Storm Water Permit is not required.

D. Impaired Water Bodies on CWA 303(d) List

1. Under section 303(d) of the 1972 CWA, states, territories and authorized tribes are required to develop lists of water quality limited segments. The waters on these lists do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. On 26 June 2015 U.S. EPA gave final approval to California’s 2012 section 303(d) List of Water Quality Limited Segments. The Basin Plan references this list of Water Quality Limited Segments (WQLS’s), which are defined as *“...those sections of lakes, streams, rivers or other fresh water bodies where water quality does not meet (or is not expected to meet) water quality standards even after the application of appropriate limitations for point sources (40 C.F.R. part 130, et seq.)”*. The Basin Plan also states, *“Additional treatment beyond minimum federal standards will be imposed on dischargers to [WQLSs]. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment.”* The listing for the Sacramento-San Joaquin Delta (northern portion) includes: chlordane, chlorpyrifos, DDT, diazinon, dieldrin, Group A pesticides, invasive species, mercury, polychlorinated biphenyls (PCB’s), and unknown toxicity.

2. **Total Maximum Daily Loads (TMDL's).** U.S. EPA requires the Central Valley Water Board to develop TMDL's for each 303(d) listed pollutant and water body combination. Table F-4, below, identifies the 303(d) listings and the status of each TMDL.

Table F-4. 303 (d) List for the Sacramento-San Joaquin Delta (Northern Portion)

Pollutant	Potential Sources	TMDL Completion ¹
Chlordane	Source Unknown	(2011)
Chlorpyrifos	Source Unknown	2007
DDT	Source Unknown	(2011)
Diazinon	Source Unknown	2007
Dieldrin	Source Unknown	(2011)
Group A Pesticides	Source Unknown	(2011)
Invasive Species	Source Unknown	(2019)
Mercury	Source Unknown	2009
PCB's	Source Unknown	(2019)
Unknown Toxicity	Source Unknown	(2019)

¹ Dates in parenthesis are proposed TMDL completion dates.

3. The 303(d) listings and TMDL's have been considered in the development of the Order. A pollutant-by-pollutant evaluation of each pollutant of concern is described in section IV.C.3 of this Fact Sheet.

E. Other Plans, Policies and Regulations

1. **Title 27, California Code of Regulations (CCR), section 20005 et seq. (hereafter Title 27).** Title 27 regulations contains the State Water Resources Control Board's water quality regulations for discharges of solid wastes to land. Exemption from Title 27 is provided if the discharges of domestic sewage or treated effluent are regulated by WDRs and are consistent with applicable water quality objectives and treatment or storage facilities associated with municipal wastewater treatment plants, provided solid wastes are discharged only in accordance with Title 27. Historically discharges of wastewater to land, including but not limited to evaporation ponds or percolation ponds, storage ponds have been exempt from the requirements of Title 27, CCR, based on section 20090 et seq. However, the State Water Resources Control Board issued a decision on another municipal wastewater treatment plant, the City of Lodi, that storage basins must be part of the treatment process in order to be included in the Title 27 exemptions.

The Facility contains solids storage, land disposal and emergency influent and effluent storage. A determination has been made by the Central Valley Water Board whether the facilities meet the exemptions from Title 27. These facilities include the Solid Storage Basins (SSB's) and Dedicated Land Disposal areas (DLD's) and Emergency Storage Basins. The Central Valley Water Board's findings regarding Title 27 exemptions are discussed below.

- a. **Solids Storage Basins (SSB's).** The SSB's are unlined storage ponds for anaerobically digested primary and secondary sludge and scum. The SSB's receive about 6,000 tons of wet sludge per day. The digested sludge has about 0.4 to 3% solids and is composed of 50 to 80% volatile solids. Digested sludge may also contain variable concentrations of contaminants such as heavy metals, chlorinated hydrocarbons and pathogens. The sludge remains in the basins from 3 to 5 years prior to discharge to the DLD's. The SSB's provide additional stabilization treatment, storage and evaporation of the sludge. In July 2009, the Discharger installed six new wells to monitor groundwater water quality. The results from those wells will determine if the SSB's are impacting groundwater and need to be lined. The SSB's are governed by Order R5-2015-0133.

- b. **Dedicated Land Disposal Areas (DLD's).** The DLD's are lined land disposal units that receive stabilized sludge from the SSB's. The semi-liquid sludge is applied to the DLD's by subsurface injection during dry seasons. To prevent leaching of heavy metals, the Discharger applies lime to maintain proper soil pH. The DLD's are not exempt from Title 27 and are governed by Order R5-2015-0133.
- c. **Corrective Action Program (CAP).** During the 1990's the groundwater beneath the DLD's were found to be impacted by elevated concentrations of nitrates, chlorides and total dissolved solids. To mitigate the impacted groundwater, the Class III landfill that took grit and screenings was closed and the DLD's were either lined or closed. The Discharger implemented a CAP in December 1995 to remediate the impacted groundwater and it consisted of extraction wells down gradient of the DLD's. The extraction wells keep the groundwater from migrating off the Facility site. The groundwater is discharged downstream of the secondary clarifiers where it continues through the remaining treatment processes and is discharged to the Sacramento River or to the on-site constructed wetlands. The CAP is operational and is regulated under Order R5-2015-0133.
- d. **Emergency Storage Basins (ESBs).** The Facility includes five Emergency Storage Basins (ESB's), ESB-A through ESB-E with a total capacity of 302 million gallons (MG). ESB-A is lined with concrete and has 15.5 MG of capacity. The purpose of ESB-A is to store diverted influent flows above the hydraulic capacity (peak wet weather flows) of the Facility and store diverted effluent flows to meet various conditions to comply with this Order. Reasons to divert final effluent to ESB-D and not discharge to the Sacramento River include maintaining the minimum 14:1 river to effluent ratio and maintaining compliance with effluent limitations for temperature and chlorine residual. Flow stored in ESB-A is returned to the headworks for treatment. Overflow from ESB-A discharges to unlined ESB-B that can, if necessary, overflow to unlined ESB-C. The combined capacity of ESB-B and C is 206 MG. Since construction of ESB-D, ESB-A is typically only used to store excess influent flows. ESB-A, B and C are exempt from Title 27 pursuant to CCR Title 27 section 20090(a) since these basins are integral to protecting the treatment processes from washing out due to peak wet weather flows or for storage of diverted flow to comply with the conditions of this Order.

ESB-D is lined with 60-mil reinforced polypropylene liner and has a capacity of 60-75 MG. The primary use of ESB-D is to store diverted chlorinated effluent to comply with flow dilution, potential chlorine excursions and thermal requirements.

Chlorinated effluent from ESB-D is returned to the Facility for dechlorination prior to discharge to the Sacramento River. Since ESB-D is lined there is minimal threat to groundwater and is consistent with water quality objectives and therefore is exempt from Title 27 pursuant to CCR Title 27 section 20090(a).

ESB-E is part of the surge relief mechanism and designed to relieve water hammer effects in the influent conduit. ESB-E stores raw influent in an unlined earthen 20 MG basin and is exempt from Title 27 pursuant to CCR Title 27 section 20090(a).

The Discharger's ongoing Flow Equalization project includes deepening and lining of the ESBs. Following the upgrades the facilities will continue to be exempt from Title 27, as discussed above. The upgrades consist of the following project elements:

- Deepening ESB-B and ESB-C to increase storage volume by approximately 115 million gallons.

- Subdividing ESB-C into three sub-basins – ESB-C1, ESB-C2, and ESB-C3.
- Installation of a new underdrain system and associated pumping station.
- Lining ESB-B, ESB-C1, ESB-C2, and ESB-C3 with roller compact concrete floors and shotcrete walls.
- Installation of a new ESB washdown distribution system for ESB-A, ESB-B, ESB-C1, ESB-C2, and ESB-C3,
- Installation of new inlet/outlet structures between each of the basins,
- Installation of a new flow-through diversion structure and valves on the existing 102-inch effluent conduits,
- Installation of new 84-inch final effluent (FE) piping and associated gates,
- Installation of new ESB drain piping to allow ESB-B, ESB-C1, ESB-C2, and ESB-C3 to drain back to the City Interceptor,
- Relocation of the existing ESB emergency overflow spillway.

2. **Water Boards' Actions to Protect Beneficial Uses of the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.** The Central Valley Water Board adopted Resolution R5-2007-0161, *Water Board's Actions to Protect Beneficial Uses of the San Francisco Bay/Sacramento- San Joaquin Delta Estuary* on 6 December 2007. The purpose of the resolution is to identify and implement actions needed to protect the San Francisco/San Joaquin Delta beneficial uses. Some actions include exercising the State Water Board's water rights authority over water right decisions and exercising the San Francisco Bay Regional Water Quality Control Board's and Central Valley Water Board's authority over controlling water quality in the Delta.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

Effluent limitations and toxic and pretreatment effluent standards established pursuant to sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the CWA and amendments thereto are applicable to the discharge.

The CWA mandates the implementation of effluent limitations that are as stringent as necessary to meet water quality standards established pursuant to state or federal law [33 U.S.C., §1311(b)(1)(C); 40 C.F.R. § 122.44(d)(1)]. NPDES permits must incorporate discharge limits necessary to ensure that water quality standards are met. This requirement applies to narrative criteria as well as to criteria specifying maximum amounts of particular pollutants. Pursuant to federal regulations, 40 C.F.R. section 122.44(d)(1)(i), NPDES permits must contain limits that control all pollutants that *"are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality."* Federal regulations, 40 C.F.R. section 122.44(d)(1)(vi), further provide that *"[w]here a state has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits."*

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal

Regulations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 C.F.R. section 122.44(d) requires that permits include WQBEL's to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where numeric water quality objectives have not been established. The Basin Plan at page IV-17.00, contains an implementation policy, "Policy for Application of Water Quality Objectives", that specifies that the Central Valley Water Board "*will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives.*" This Policy complies with 40 C.F.R. section 122.44(d)(1). With respect to narrative objectives, the Central Valley Water Board must establish effluent limitations using one or more of three specified sources, including: (1) U.S. EPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Central Valley Water Board's "Policy for Application of Water Quality Objectives")(40 C.F.R. § 122.44(d)(1)(vi)(A), (B) or (C)), or (3) an indicator parameter.

The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, discoloration, radionuclides, and tastes and odors. The narrative toxicity objective states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00) The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The narrative chemical constituents objective states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At minimum, "*...water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)*" in Title 22 of CCR. The Basin Plan further states that, to protect all beneficial uses, the Central Valley Water Board may apply limits more stringent than MCL's. The narrative tastes and odors objective states: "*Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.*"

A. Discharge Prohibitions

1. **Prohibition III.A (No discharge or application of waste other than that described in this Order).** This prohibition is based on Water Code section 13260 that requires filing of a ROWD before discharges can occur. The Discharger submitted a ROWD for the discharges described in this Order; therefore, discharges not described in this Order are prohibited. Consistent with Order R5-2010-0114-04, this Order allows the Discharger to reclaim disinfected secondary effluent for dust control and compaction on construction projects, landscape irrigation, wash down water, vehicle washing and grounds maintenance within the Facility boundaries, and for flushing of pipelines within the sewer collection system. It may also be used for in-plant process water and fire protection and used in the tertiary treatment plant and distribution system. This Order requires that use of reclaimed disinfected secondary effluent meet the requirements of CCR, title 22, section 60301, et seq. and the associated DDW guidelines as applicable. Runoff of disinfected secondary effluent is prohibited except as regulated by Master Reclamation Permit No. 97-146.
2. **Prohibition III.B (No bypasses or overflow of untreated wastewater, except under the conditions at 40 C.F.R. section 122.41(m)(4)).** As stated in section I.G of Attachment D, Standard Provisions, this Order prohibits bypass from any portion of the treatment facility. Federal regulations, 40 C.F.R. section 122.41(m), define "bypass" as the intentional diversion of waste streams from any portion of a treatment facility. This section of the federal regulations, 40 C.F.R. section 122.41(m)(4), prohibits bypass

unless it is unavoidable to prevent loss of life, personal injury, or severe property damage. In considering the Regional Water Board's prohibition of bypasses, the State Water Board adopted a precedential decision, Order No. WQO 2002-0015, which cites the federal regulations, 40 C.F.R. section 122.41(m), as allowing bypass only for essential maintenance to assure efficient operation.

3. **Prohibition III.C (No controllable condition shall create a nuisance).** This prohibition is based on Water Code section 13050 that requires water quality objectives established for the prevention of nuisance within a specific area. The Basin Plan prohibits conditions that create a nuisance.
4. **Prohibition III.D (No inclusion of pollutant free wastewater shall cause improper operation of the Facility's systems).** This prohibition is based on 40 C.F.R. section 122.41 et seq. that requires the proper design and operation of treatment facilities.
5. **Prohibition III.E (No discharge when the Sacramento River instantaneous flow is less than 1,300 cfs) and Prohibition III.F (No discharge when there is less than 14:1 (river: effluent) flow ratio).** Previous Order 5-00-188 included the discharge prohibition of no discharge unless the river is flowing more than 1,300 cfs and there is at least a 14 to 1 flow ratio (river: effluent). These conditions were based on previous studies that determined river flows of at least 1,300 cfs and providing a flow ratio of at least 14 to 1 (river: effluent) are required to allow adequate mixing of the effluent. Although the diffuser configuration has changed from 99 ports to 74 ports and new dye studies confirmed the dynamic modeling showing mixing zones, all the analysis for antidegradation, thermal plumes, and dilution credits have been based on continuing these conditions. Therefore, consistent with previous Orders 5-00-188 and R5-2010-0114-04, these conditions remain in this Order.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Section 301(b) of the CWA and implementing U.S. EPA permit regulations at 40 C.F.R. section 122.44 require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 C.F.R. part 133.

Regulations promulgated in 40 C.F.R. section 125.3(a)(1) require technology-based effluent limitations for municipal Dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTW's [defined in section 304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the U.S. EPA Administrator.

Based on this statutory requirement, U.S. EPA developed secondary treatment regulations, which are specified in 40 C.F.R. part 133. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of biochemical oxygen demand (BOD₅), total suspended solids (TSS), and pH.

2. Applicable Technology-Based Effluent Limitations

- a. **BOD₅ and TSS.** Federal regulations at 40 C.F.R. part 133, establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD₅ and TSS. A daily maximum effluent limitation for BOD₅ and TSS is also included in the Order to ensure that the treatment works are not organically overloaded and operate in accordance with design capabilities. In addition, 40 C.F.R. section 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. This Order contains a limitation requiring an average of 85 percent removal of BOD₅ and TSS over each calendar month. This Order requires WQBEL's that are equal to or more stringent than the secondary technology-based treatment described in 40 C.F.R. part 133 (see section IV.C.3 of the Fact Sheet for a discussion on pathogens which includes WQBEL's for BOD₅ and TSS).
- b. **Flow.** The Facility was designed to provide a secondary level of treatment for up to a design flow of 181 MGD. Therefore, this Order contains an average dry weather discharge flow effluent limit of 181 MGD.
- c. **pH.** The secondary treatment regulations at 40 C.F.R. part 133 also require that pH be maintained between 6.0 and 9.0 standard units. This Order, however, requires a more stringent instantaneous maximum effluent limitation for pH, as discussed further in section IV.C.3 of this Fact Sheet.

Summary of Technology-based Effluent Limitations Discharge Point 001

Table F-5. Summary of Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Flow	MGD	181 ¹	--	--	--	--
Conventional Pollutants						
Biochemical Oxygen Demand (5-day @ 20°C) ²	mg/L	30	45	--	--	--
	lbs/day ³	45,286	67,929	--	--	--
	% Removal	85	--	--	--	--
pH ²	standard units	--	--	--	6.0	9.0
Total Suspended Solids ²	mg/L	30	45	--	--	--
	lbs/day ³	45,286	67,929	--	--	--
	% Removal	85	--	--	--	--

¹ The average dry weather flow shall not exceed 181 MGD.

² Note that more stringent WQBEL's for BOD₅, pH, and TSS are applicable and are established as final effluent limitations in this Order (see section IV.C.3 of this Fact Sheet).

³ Based on an average dry weather flow of 181 MGD.

C. Water Quality-Based Effluent Limitations (WQBEL's)

1. Scope and Authority

CWA Section 301(b) and 40 C.F.R. section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements and other provisions, is discussed in section IV.C.3 of this Fact Sheet.

Section 122.44(d)(1)(i) of 40 C.F.R. requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBEL's must be established using: (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBEL's when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution No. 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply.

The Basin Plan on page II-1.00 states: "*Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning...*" and with respect to disposal of wastewaters states that "*...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses.*"

The federal CWA section 101(a)(2), states: "*it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983.*" Federal Regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal Regulations, 40 C.F.R. sections 131.2 and 131.10, require that all waters of the State regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation.

40 C.F.R. section 131.3(e) defines existing beneficial uses as those uses actually attained after 28 November 1975, whether or not they are included in the water quality

standards. Federal Regulation, 40 C.F.R. section 131.10 requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

- a. **Receiving Water and Beneficial Uses.** The Sacramento-San Joaquin Delta is vital to California and comprises over 700 miles of interconnected waterways and encompasses 1,153 square miles. The Sacramento-San Joaquin Delta is home to over 280 species of birds and more than 50 species of fish, making it one of the most ecologically important aquatic habitats in the State. Drinking water for over 25 million Californians is pumped from the Sacramento-San Joaquin Delta via the State Water Project, Central Valley Water Project, and local water intakes. The Sacramento-San Joaquin Delta supports California's trillion dollar economy with \$27 billion annually for agriculture. Additionally, the Delta has 12 million user-days for recreation each year.

The Sacramento River at Freeport is within the designated critical habitat for five federally-listed fish species including winter- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*), Steelhead (*O. mykiss*), Delta smelt (*Hypomesus transpacificus*) and Green sturgeon (*Acipenser medirostris*). Other listed wildlife species that feed on Central Valley fishes include the California Least Tern (*Stenula antillarum brownie*) and the Giant Garter snake (*Thamnopsis gigas*). In addition to the federally-listed species the California State Species of Special Concern include the Sacramento Splittail (*Pogonichthys macrolepidotus*) and the Central Valley Fall/Late-Fall Salmon (*Oncorhynchus tshawytscha*).

Refer to section III.C.1 of this Fact Sheet for a complete description of the beneficial uses.

- b. **Effluent and Ambient Background Data.** The reasonable potential analysis (RPA), as described in section IV.C.3 of this Fact Sheet, was based on data collected between January 2012 and December 2014 which includes effluent and ambient background data submitted in SMR's.
- c. **Assimilative Capacity/Mixing Zone**
 - i. **Receiving Water Characteristics.** The lower Sacramento River in the vicinity of the discharge is a large river with sufficient flows for dilution. The Sacramento watershed is a heavily managed system of reservoirs and diversions. The Sacramento River near the discharge location (Freeport) drains a 26,146-square-mile basin that spans the entire northern Central Valley of California from the crest of the Coast Range to the crest of the Sierra Nevada. Flows in the Sacramento River are influenced by precipitation (rainfall and snowpack/snowmelt), but are also influenced by several reservoirs on the tributaries and main stem, which are managed for flood control, water supply, and hydroelectric power generation. Irrigation diversions and agricultural return flows also affect the river regime. Winter and spring flows in the Sacramento River often exceed 50,000 cfs. While summer flows average 10,000 cfs, they can fall below 4,000 cfs. Daily flow probabilities for the Sacramento River at Freeport, based on U.S. Geologic Survey gauged flow data from 1942-1989, indicate that there is only a 10% probability of flows less than or equal to 10,000 cfs, and a 10% probability of flows greater than 70,000 cfs. Therefore, typical flows in the Sacramento range from 10,000 to 70,000 cfs. The critical low flows for the Sacramento River based on flow data at Freeport from 1970 to 2009 are shown in Table F-6, below.

Table F-6. Critical Receiving Water Flows

Critical Low Flows	Receiving Water Flow (cfs)
1Q10 ¹	5,060
7Q10 ²	5,846
30Q5 ³	8,234
Harmonic Mean ⁴	15,403

- ¹ Lowest daily average flow with a return frequency of 10 years.
- ² Lowest 7-day average flow with a return frequency of 10 years.
- ³ Lowest 30-day average flow with a return frequency of 5 years.
- ⁴ At Freeport from 1 January 1970 through 31 December 2014.

- ii. **Regulatory Guidance for Dilution Credits and Mixing Zones.** The Discharger has requested mixing zones and dilution credits for compliance with acute and chronic aquatic life water quality criteria (i.e., copper, cyanide, and chronic whole effluent toxicity) and human health water quality criteria (i.e., chlorodibromomethane, dichlorobromomethane, bis (2-ethylhexyl) phthalate, and carbon tetrachloride). The Central Valley Water Board has the discretion to accept or deny mixing zones and dilution credits.

The CWA directs the states to adopt water quality standards to protect the quality of its waters. U.S. EPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 C.F.R. § 122.44 and 122.45). The U.S. EPA allows states to have broad flexibility in designing its mixing zone policies. Primary policy and guidance on determining mixing zone and dilution credits is provided by the SIP and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Central Valley Water Board may use the U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001)(TSD).

For non-priority pollutant constituents the allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, *Policy for Application of Water Quality Objectives*, which states in part, "In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's *Water Quality Standards Handbook* and the [TSD]. Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge."

For priority pollutants, the SIP supersedes the Basin Plan mixing zone provisions. Section 1.4.2 of the SIP states, in part, "...with the exception of effluent limitations derived from TMDL's, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may

*grant mixing zones and dilution credits to dischargers...The applicable priority pollutant criteria and objectives are to be met through a water body except within any mixing zone granted by the Regional Board. **The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis.** The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board.” [emphasis added]*

*For completely-mixed discharges, Section 1.4.2.1 of the SIP states, “For completely-mixed discharges, as determined by the RWQCB and based on information provided by the discharger, the amount of receiving water available to dilute the effluent shall be determined by calculating the *dilution ratio (i.e., the critical receiving water flow divided by the effluent flow) using the appropriate flows in Table 3. In no case shall the RWQCB grant a dilution credit that is greater than the calculated dilution ratio. The dilution credit may be set equal to the dilution ratio only if the site-specific conditions concerning the discharge and the receiving water do not indicate that a smaller dilution credit is necessary to protect beneficial uses and meet the conditions of this Policy. If, however, dilution ratios that are calculated using the Table 3 parameters are inappropriate for use due to site-specific issues, the mixing zone and dilution credit shall be determined using site-specific information and procedures detailed for incompletely-mixed discharges.”*

For incompletely-mixed discharges, the Discharger must complete an independent mixing zone study to demonstrate to the Central Valley Water Board that a dilution credit is appropriate. In granting a mixing zone, Section 1.4.2.2 of the SIP requires the following to be met:

***“A mixing zone shall be as small as practicable.** The following conditions must be met in allowing a mixing zone: [emphasis added]*

A: A mixing zone shall not:

- 1. compromise the integrity of the entire water body;*
- 2. cause acutely toxic conditions to aquatic life passing through the mixing zone;*
- 3. restrict the passage of aquatic life;*
- 4. adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws;*
- 5. produce undesirable or nuisance aquatic life;*
- 6. result in floating debris, oil, or scum;*
- 7. produce objectionable color, odor, taste, or turbidity;*
- 8. cause objectionable bottom deposits;*
- 9. cause nuisance;*
- 10. dominate the receiving water body or overlap a mixing zone from different outfalls; or*
- 11. be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this*

determination and the Sources of Drinking Water Policy (Resolution No. 88-63), this SIP supersedes the provisions of that policy.”

Section 1.4.2.1 of the SIP establishes the authority for the Central Valley Water Board to consider dilution credits based on the mixing zone conditions in a receiving water. Section 1.4.2.1 in part states:

*“The dilution credit, D, is a numerical value associated with the mixing zone that accounts for the receiving water entrained into the discharge. The dilution credit is a value used in the calculation of effluent limitations (described in Section 1.4). **Dilution credits may be limited or denied on a pollutant-by-pollutant basis, which may result in a dilution credit for all, some, or no priority pollutants in the discharge.**”* [emphasis added]

The mixing zone is thus an administrative construct defined as an area around the outfall that may exceed water quality objectives, but is otherwise protective of the beneficial uses. Dilution is defined as the amount of mixing that has occurred at the edge of this mixing zone under critical conditions, thus protecting the beneficial uses at the concentration and for the duration and frequency required.

- iii. **Dilution/Mixing Zone Study Results.** For completely-mixed discharges, the Central Valley Water Board may grant a mixing zone and apply a dilution credit in accordance with Section 1.4.2.1 of the SIP, based on the dilution ratio. For incompletely-mixed discharges, the Discharger must perform a mixing zone study to demonstrate to the Central Valley Water Board that a dilution credit is appropriate. The discharge is considered an incompletely-mixed discharge, so the Discharger conducted a mixing zone study. A mathematical dynamic model was developed by Flow Sciences Incorporated and consists of five models linked in series, with the output from previous models used as part of the inputs to subsequent models. The models are linked as shown in Figure F-1 and are described below.

PROSIM – U.S. Bureau of Reclamation’s Project Simulation Model. PROSIM simulates the existing hydrologic conditions in the Delta study area and was used to calculate the 70-year period of record (1922-1991) that served as the basis for the Discharger’s study. Flow and storage calculated by PROSIM was used as input to the Temperature Models. Also, output from PROSIM were used as input to the Fischer Delta Model (FDM) and includes: export pumping rates from Tracy and Banks; Contra Costa Water District pumping at Rock Slough and Old River; North Bay Aqueduct pumping; City of Vallejo pumping; net Delta consumptive use; Delta Cross Channel position; and Delta inflows from Yolo Bypass, San Joaquin River, Calaveras River, Cosumnes River, Mokelumne River, and Sacramento River.

Temperature Models – U.S. Bureau of Reclamation models. The Bureau of Reclamation has developed temperature models for five reservoirs (Trinity, Whiskeytown, Shasta, Oroville, and Folsom) and three river systems (Sacramento, Feather, and American). These models estimate mean monthly water temperatures based on flow and storage quantities calculated by PROSIM.

FDM – Fischer Delta Model. The Fischer Delta Model was used to support both the near-field and far-field modeling. For the near-field region, FDM was used to disaggregate hourly flow rates for the Sacramento River at Freeport

from the 70-year record of monthly flows calculated by PROSIM. The hourly flow data were then used as input to the 3-D near-field model (FLOWMOD) as well as the Longitudinal Dispersion model. For the far-field region, FDM was used to simulate the contribution of Facility discharges to water quality concentrations at various critical locations in the Delta.

FLOWMOD – Flow Science’s computational fluid dynamics model. The near-field modeling was accomplished with the 3-dimensional FLOWMOD computational fluid dynamics model developed by Flow Science. FLOWMOD was used to calculate the steady-state concentration of effluent in each grid cell of the model domain for specific combinations of river and effluent flow rates. A horizontal grid resolution of 6 feet was defined from the diffuser to a point 300 feet downstream of the diffuser. The grid resolution increased geometrically from 300 feet to 700 feet downstream of the diffuser. Results from the model defined the average effluent concentration in the area of impact (i.e., within the 200:1 dilution contour) downstream of the diffuser. The Discharger used this model to separately evaluate the thermal characteristics of the discharge plume.

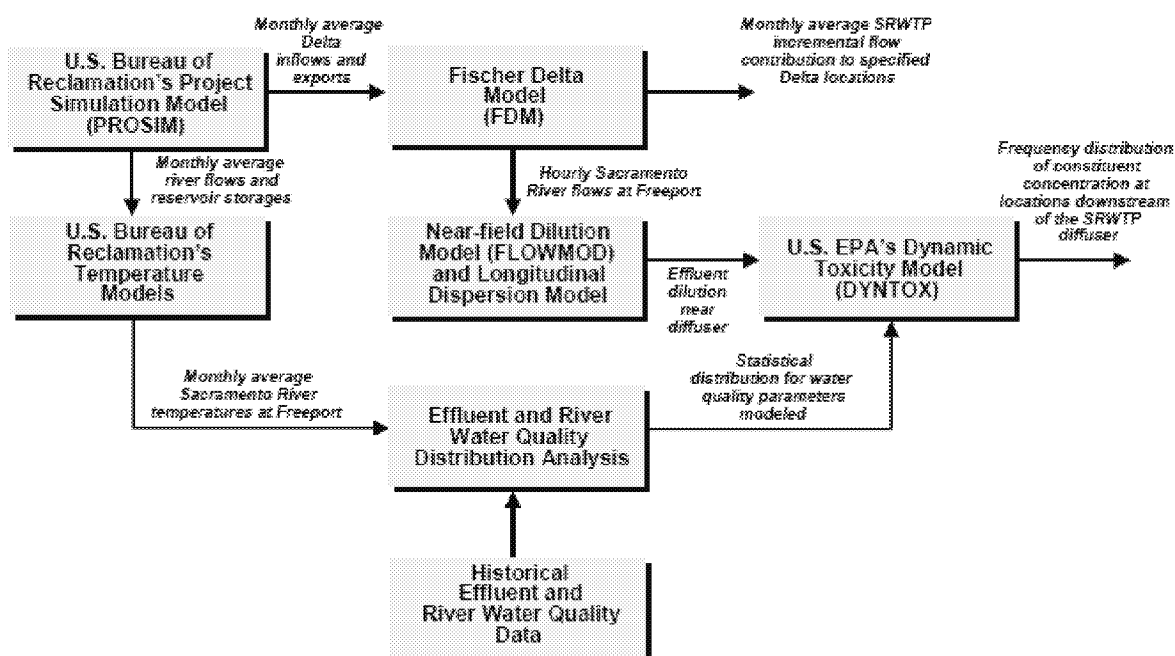
LD – Flow Science’s Longitudinal Dispersion Model. The LD model was developed by Flow Science and the computer code is written in the Matlab programming language for implementation on an IBM-PC compatible microcomputer. This 1-dimensional model simulates the advection and dispersion of effluent discharged to the Sacramento River including reverse tidal flow conditions. The LD model is used to estimate the concentration in the near-field vicinity of the diffuser following the start of a diversion event in which the effluent discharge is diverted to storage when the Sacramento River flow rate falls below the minimum required 14:1 dilution ratio¹.

The results from the LD model are combined with the results from the FLOWMOD model (by method of superposition) to estimate the concentrations of the effluent in the near-field zone that result from “double dosing” during the flow reversal events. The length of the LD model domain is 53,000 feet (about 10 miles) and includes the diffuser. The model domain is represented by 530 discrete spatial intervals, each 100 feet long. Calculations are made at a 400-second time step.

DYNTOX – U.S. EPA’s Dynamic Toxicity Model. DYNTOX was developed in 1985 with funding support provided by U.S. EPA. The model is designed for waste load allocations of toxic substances. DYNTOX contains three procedures to define the frequency and duration of exposure above a specific water quality criterion: (1) continuous simulation, (2) Monte Carlo simulation, and (3) log normal analysis. The continuous simulation procedure with randomly generated water quality distributions was used for the Discharger’s study. Hourly values for the 70-year simulation period resulted in over 600,000 data points that were representative of the statistical concentration distribution at 6 key locations downstream of the diffuser.

¹ The Discharger is prohibited from discharging when the dilution ratio (river:effluent) is less than 14:1 or if river flows are less than 1,300 cfs and diverts all effluent discharge to emergency storage basins. These requirements ensure the diffuser is operating as designed and limits double-dosing of the discharge during flow reversals.

Figure F-1. Dynamic Model Flow Diagram



In the period from 2005 through 2007, the Discharger performed several field validation studies to corroborate the effectiveness of the modeling tools in representing water quality conditions in the Sacramento River. Due to the complexity of the mathematical models, in 2006 the Central Valley Water Board used the services of Tetra Tech, a U.S. EPA contractor, to assist with the review of the dynamic model. Tetra Tech's modeling experts concluded that the model study was conducted in a sound and scientifically defensible manner. The modeling experts determined that the linked dynamic modeling system is capable of providing an accurate probabilistic representation of receiving water quality conditions. The only perceived shortcoming noted by the model experts from a regulatory perspective was the complexity of the system of linked models and the proprietary status of some of the model components preventing its transmittal and direct use by Central Valley Water Board staff. The results of Tetra Tech's review are summarized in a Tetra Tech memorandum dated 30 June 2008.

The Discharger provided an update to the dynamic modeling results in its 14 August 2015 *Mixing Zone Request* that reflected effluent data collected between January 2012 and December 2014 and an expanded historical ambient dataset to include data from 2005 to 2014.

- iv. **Evaluation of Available Dilution for Acute Aquatic Life Criteria.** U.S. EPA Region VIII, in its "*EPA Region VIII Mixing Zones and Dilution Policy*", recommends no dilution for acute aquatic life criteria, stating the following, "*In incomplete mix situations, discharge limitations to implement acute chemical-specific aquatic life criteria and narrative (no acute toxicity) criteria shall be based on achieving such acute criteria at the end-of-pipe (i.e., without an allowance for dilution). This approach is intended to implement the narrative requirement prohibiting acutely toxic conditions in the mixing zone.*" The

Discharger has requested an acute mixing zone for compliance with acute water quality criteria.

The Discharger requested in their 14 August 2015 *Mixing Zone Request* an acute aquatic life mixing zone that is 300 feet wide and extends 60 feet downstream of the diffuser. The requested acute mixing zone meets the requirements of the SIP as follows:

- (a) *Shall not compromise the integrity of the entire waterbody* – The TSD states that, “If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.”¹ The Sacramento River is approximately 600 feet wide at the surface. The acute mixing zone is approximately 60 feet long by 300 feet wide, located along the bottom half of the river. The Sacramento River is a very large waterbody. For the pollutants for which a mixing zone was requested, the acute mixing zone would not compromise the integrity of the entire waterbody.
- (b) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The SIP requires that the acute mixing zone be appropriately sized to prevent lethality to organisms passing through the mixing zone. U.S. EPA recommends that float times through a mixing zone less than 15 minutes ensures that there will not be lethality to passing organisms. The acute mixing zone proposed by the Discharger extends 60 feet downstream from the outfall. Based on a minimum river velocity of 0.35 feet/second, the minimum float time is 2.8 minutes². Furthermore, this Order includes an acute toxicity effluent limitation that requires compliance to be determined based on acute bioassays using 100% effluent. Compliance with these requirements ensures that acutely toxic conditions to aquatic life passing through the chronic mixing zone do not occur.
- (c) *Shall not restrict the passage of aquatic life* – The Discharger developed a dynamic model to evaluate the near-field effects of the discharge. The dynamic model was used to evaluate the zone of passage around the mixing zone where water quality objectives are met. The dynamic model indicates there is a zone of passage for aquatic life, which was verified through dye testing. The size of the zone of passage varies on either side of the river depending on the river geometry³. The surface of the river is approximately 600 feet across and the bottom of the river is approximately 500 feet across. Based on the model, a zone of passage approximately 75 to 100 feet wide occurs along the west bank and 175 to 200 feet wide occurs along the east bank downstream of the discharge. Because the diffuser is located at the bottom of the river, the mixing zone will typically occupy only a portion of the bottom half of the river at the edge of the 60 foot mixing zone.

¹ TSD, pg. 33

² Memorandum from Larry Walker Associates to the Discharger, *Mixing Zones and Prevention of Acutely Toxic Conditions*, dated 13 July 2009.

³ *Model Verification Results for FLOWMOD Simulations of SRCSD Effluent Discharge to the Sacramento River at Freeport, November 2007 Field Study*, Flow Science

- (d) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The acute mixing zone will not cause acutely toxic conditions, allows adequate zones of passage, and is sized appropriately to ensure that there will be no adverse impacts to biologically sensitive or critical habitats. The Discharger evaluated the probability of migratory and resident fish being exposed to acute or chronic toxicity in the vicinity of the discharge and found that fish did not congregate and hold within the discharge plume for continuous periods of time sufficient to result in exposure durations that would cause acute or chronic toxicity, based on plume water quality.
- (e) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The current discharge has not been shown to result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration, which will ensure continued compliance with these mixing zone requirements. With these requirements the acute mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.
- (f) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The acute mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.
- (g) *Shall not be allowed at or near any drinking water intake* – The acute mixing zone is not near a drinking water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

Although the acute aquatic life mixing zone complies with the SIP and the Basin Plan, due to concerns with aquatic toxicity in the Delta, the Central Valley Water Board has denied the allowance of an acute aquatic life mixing zone in this Order. Section 1.4.2 of the SIP states, in part, “... *The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis.*” In this case, the Delta is impaired for unknown toxicity and has experienced a significant pelagic organism decline. Therefore, the Central Valley Water Board finds that the allowance of an acute aquatic life mixing zone is not acceptable for this discharge.

- v. **Evaluation of Available Dilution for Chronic Aquatic Life Criteria.** The chronic aquatic life mixing zone is sized to protect the water body as a whole and is generally larger than the acute mixing zone. A mixing zone for chronic aquatic life criteria has been allowed in this Order for development of the WQBEL's for copper and cyanide.

The chronic aquatic life mixing zone is 400 feet wide and extends 60 feet downstream of the diffuser. The chronic mixing zone meets the requirements of the SIP as follows.

- (a) *Shall not compromise the integrity of the entire waterbody* – The TSD states that, “If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.”¹ The Sacramento River is approximately 600 feet wide at the surface. The chronic mixing zone is approximately 400 feet wide by 60 feet long, located along the bottom half of the river. The Sacramento River is a very large waterbody. For the pollutants for which a mixing zone was requested, the chronic mixing zone would not compromise the integrity of the entire waterbody.
- (b) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The chronic mixing zone does not allow acute aquatic life criteria to be exceeded and this Order requires acute bioassays to be conducted using 100% effluent. Compliance with these requirements ensures that acutely toxic conditions to aquatic life passing through the chronic mixing zone do not occur.
- (c) *Shall not restrict the passage of aquatic life* – The Discharger developed a dynamic model to evaluate the near-field effects of the discharge. The dynamic model was used to evaluate the zone of passage around the mixing zone where water quality objectives are met. The dynamic model indicates there is a zone of passage for aquatic life, which was verified through dye testing. The size of the zone of passage varies on either side of the river depending on the river geometry². The surface of the river is approximately 600 feet across and the bottom of the river is approximately 500 feet across. Based on the model, , the zone of passage at the surface of the river is generally at least 100 feet on both sides of the river, while the zone of passage at the bottom of the river is greater than 40 feet from both sides of the river.
- (d) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The chronic mixing zone will not cause acutely toxic conditions, allows adequate zones of passage, and, except as noted for ammonia in subsection vii, below, is sized appropriately to ensure that there will be no adverse impacts to biologically sensitive or critical habitats. The Discharger evaluated the probability of migratory and resident fish being exposed to acute or chronic toxicity in the vicinity of the discharge and found that fish did not congregate and hold within the discharge plume for continuous periods of time sufficient to result in exposure durations that would cause acute or chronic toxicity, based on plume water quality.
- (e) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The current discharge has not been shown to result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable

¹ TSD, pg. 33

² *Model Verification Results for FLOWMOD Simulations of SRCSD Effluent Discharge to the Sacramento River at Freeport, November 2007 Field Study*, Flow Science

bottom deposits; or cause nuisance. This Order requires the discharge meets Title 22 (or equivalent) tertiary filtration, which will ensure continued compliance with these mixing zone requirements. With these requirements the chronic mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

- (f) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The chronic mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.
- (g) *Shall not be allowed at or near any drinking water intake* – The chronic mixing zone is not near a drinking water intake. The nearest downstream drinking water intake is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

The chronic aquatic life mixing zone therefore complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Central Valley Water Board considered the procedures and guidelines in the EPA's Water Quality Standards Handbook, 2d Edition (updated July 2007), Section 5.1, and Section 2.2.2 of the TSD. The SIP incorporates the same guidelines.

- vi. **Evaluation of Available Dilution for Human Health Criteria.** The Discharger's dynamic model is useful in determining the mixing and dilution near the discharge (i.e., near-field) and the model domain extends 700 feet downstream. Human health-based criteria are generally based long-term exposures, such as safe levels for lifetime exposure (e.g., for carcinogens, consumption of 1 liter/day for 70 years) and the mixing zones typically extend beyond the near-field mixing estimated by the Discharger's dynamic model. Since the human health mixing zone extends beyond the model domain of the dynamic model, the Discharger conducted a study titled "*Sacramento River Harmonic Mean Mixing Zone Report*" (June 2010) to establish the human health mixing zone and dilution. The June 2010 study identified the point downstream of the discharge where complete mixing occurs. Based on the results of the June 2010 study, the discharge is completely-mixed approximately 3 miles downstream. The Discharger has requested the human health mixing zone extend to this point.

In determining the available receiving water dilution for compliance with human health criteria, the SIP, section 1.4.2.1 requires that the harmonic mean of the receiving water flow be compared against the arithmetic mean of the effluent flow of the observed discharge period. Based on Sacramento River flow data at Freeport from 1 January 1970 to 31 December 2014, the harmonic mean river flow is 15,403 cfs. The permitted average dry weather flow for the Facility is 181 MGD (280 cfs). Therefore, a dilution ratio of 55:1 is available for compliance with human health criteria. This Order allows a dilution credit for human health criteria of 55:1 and the mixing zone extends 3 miles downstream of the discharge. A mixing zone for human health criteria has been allowed in

this Order for development of the WQBEL's for bis (2-ethylhexyl) phthalate, carbon tetrachloride, chlorodibromomethane, and dichlorobromomethane.

The human health criteria mixing zone meets the requirements of the SIP as follows:

- (a) *Shall not compromise the integrity of the entire waterbody* – The TSD states that, “If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a waterbody (such as a river segment), then mixing zones are likely to have little effect on the integrity of the waterbody as a whole, provided that the mixing zone does not impinge on unique or critical habitats.”¹ The Sacramento River is a very large waterbody and the human health mixing zone is not applicable to aquatic life criteria, therefore, the human health mixing zone does not compromise the integrity of the entire waterbody.
- (b) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The human health mixing zone is not applicable to aquatic life criteria. Therefore, acutely toxic conditions will not occur in the mixing zone.
- (c) *Shall not restrict the passage of aquatic life* – The human health mixing zone is not applicable to aquatic life criteria. Therefore, the mixing zone will not restrict the passage of aquatic life.
- (d) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws* – The human health mixing zone is not applicable to aquatic life criteria, therefore, the mixing zone will not impact biologically sensitive or critical habitats.
- (e) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The allowance of a human health mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.
- (f) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The human health mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge.
- (g) *Shall not be allowed at or near any drinking water intake* – There are no drinking water intakes within the human health mixing zone. The nearest drinking water intake is the Freeport Regional Water Authority intake 1 mile upstream of the discharge at Freeport, which is owned and operated by East Bay Municipal Utility District (EBMUD) and Sacramento County Water Agency (SCWA). An operating agreement between the Freeport Regional Water Authority and the Discharger dated 2006 will prevent diversion of river water containing diluted treated wastewater at the Freeport water intake. The nearest downstream drinking water intake

¹ TSD, pg. 33

is the Barker Slough Pumping Plant, which is approximately 40 miles downstream of the discharge.

The human health mixing zone therefore complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Central Valley Water Board considered the procedures and guidelines in the EPA's Water Quality Standards Handbook, 2d Edition (updated July 2007), Section 5.1, and Section 2.2.2 of the TSD. The SIP incorporates the same guidelines.

vii. **Evaluation of Available Dilution for Specific Constituents (Pollutant-by-Pollutant Evaluation).** When determining to allow dilution credits for a specific pollutant, several factors must be considered, such as available assimilative capacity, facility performance, and best practicable treatment or control (BPTC). In this subsection a pollutant-by-pollutant evaluation of dilution is discussed. The Discharger requested in their 14 August 2015 *Mixing Zone Request* acute and chronic aquatic life dilution credits for copper and cyanide. Human health dilution credits were requested for bis (2-ethylhexyl) phthalate, carbon tetrachloride, chlorodibromomethane, and dichlorobromomethane. A pollutant-by-pollutant evaluation of dilution is discussed below:

- (a) **Bis (2-Ethylhexyl) Phthalate.** Based on existing effluent data between January 2012 and December 2014, it appears that the Facility cannot meet end-of-pipe effluent limitations for bis (2-ethylhexyl) phthalate. Assimilative capacity is available for bis (2-ethylhexyl) phthalate in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBEL's for bis (2-ethylhexyl) phthalate have been developed considering the allowance of human health dilution credits. Section 1.4.2.2 of the SIP requires that, "*A mixing zone shall be as small as practicable.*", and Section 1.4.2.2.B requires, "*The RWQCB shall deny or significantly limit a mixing zone and dilution credits as necessary to protect beneficial uses, meet the conditions of this Policy, or comply with other regulatory requirements.*" A 55:1 dilution credit is available for bis (2-ethylhexyl) phthalate, which will allow a final AMEL of 83 µg/L and a MDEL of 184 µg/L; however, the Facility performance level is 20 µg/L (i.e., projected maximum effluent concentration) based on monitoring data from 2012 to 2014. Therefore, the Facility can meet more stringent WQBEL's for bis (2-ethylhexyl) phthalate than with the full allowance of dilution. This Order contains an AMEL of 8.9 µg/L and MDEL of 20 µg/L for bis (2-ethylhexyl) phthalate, based on Facility performance. This represents a mixing zone that is as small as practicable for this Facility and that fully complies with the SIP.
- (b) **Carbon tetrachloride.** Based on existing effluent data between January 2012 and December 2014, it appears that the Facility cannot meet end-of-pipe effluent limitations for carbon tetrachloride. Assimilative capacity is available for carbon tetrachloride in the receiving water, and, as discussed above, the human health mixing zone meets the requirements of the SIP and Basin Plan. Therefore, the WQBEL's for carbon tetrachloride have been developed considering the allowance of human health dilution credits. Section 1.4.2.2 of the SIP requires that, "A